No. 786,503. PATENTED APR. 4. 1905.

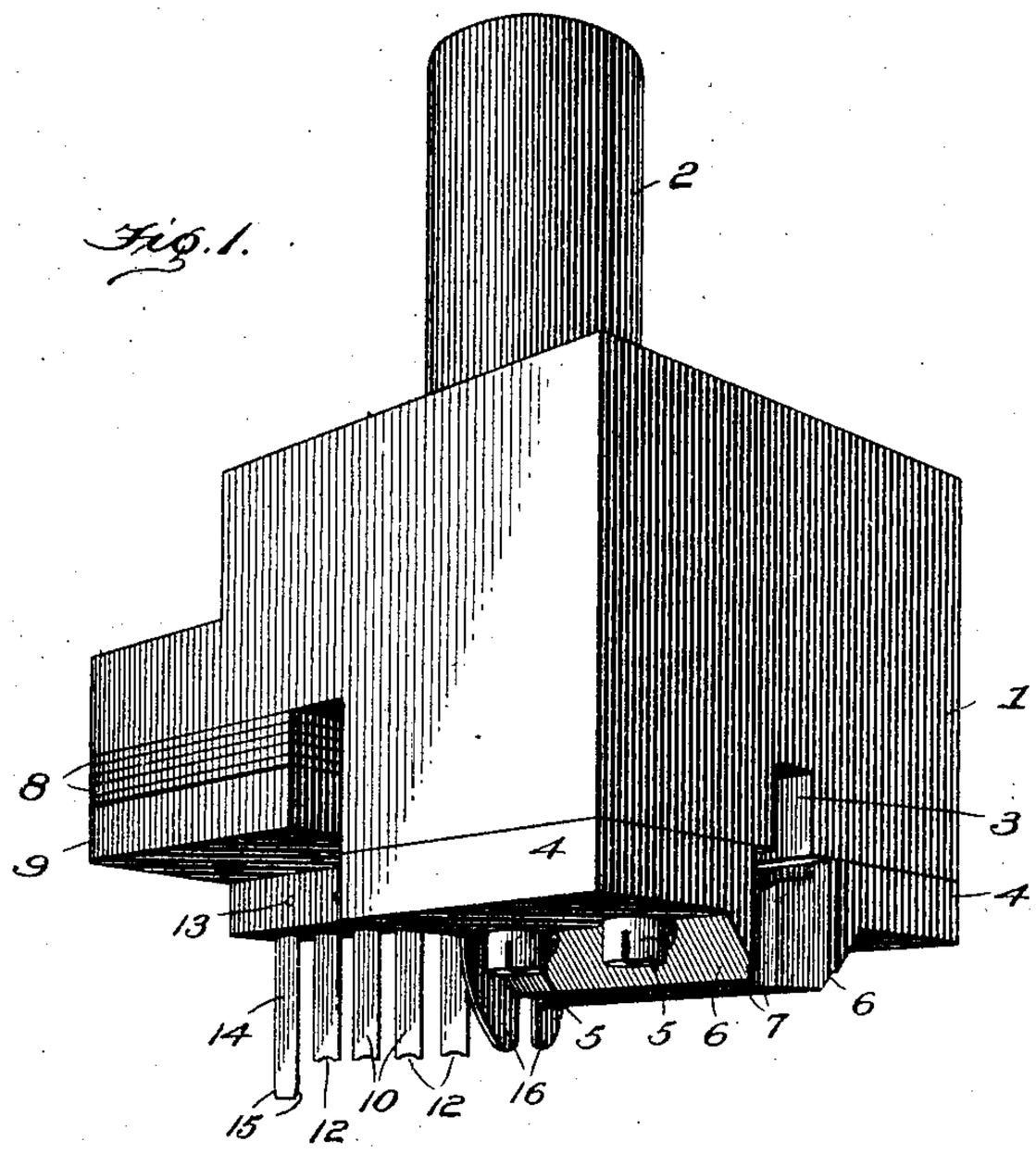
R. B. LEWIS.

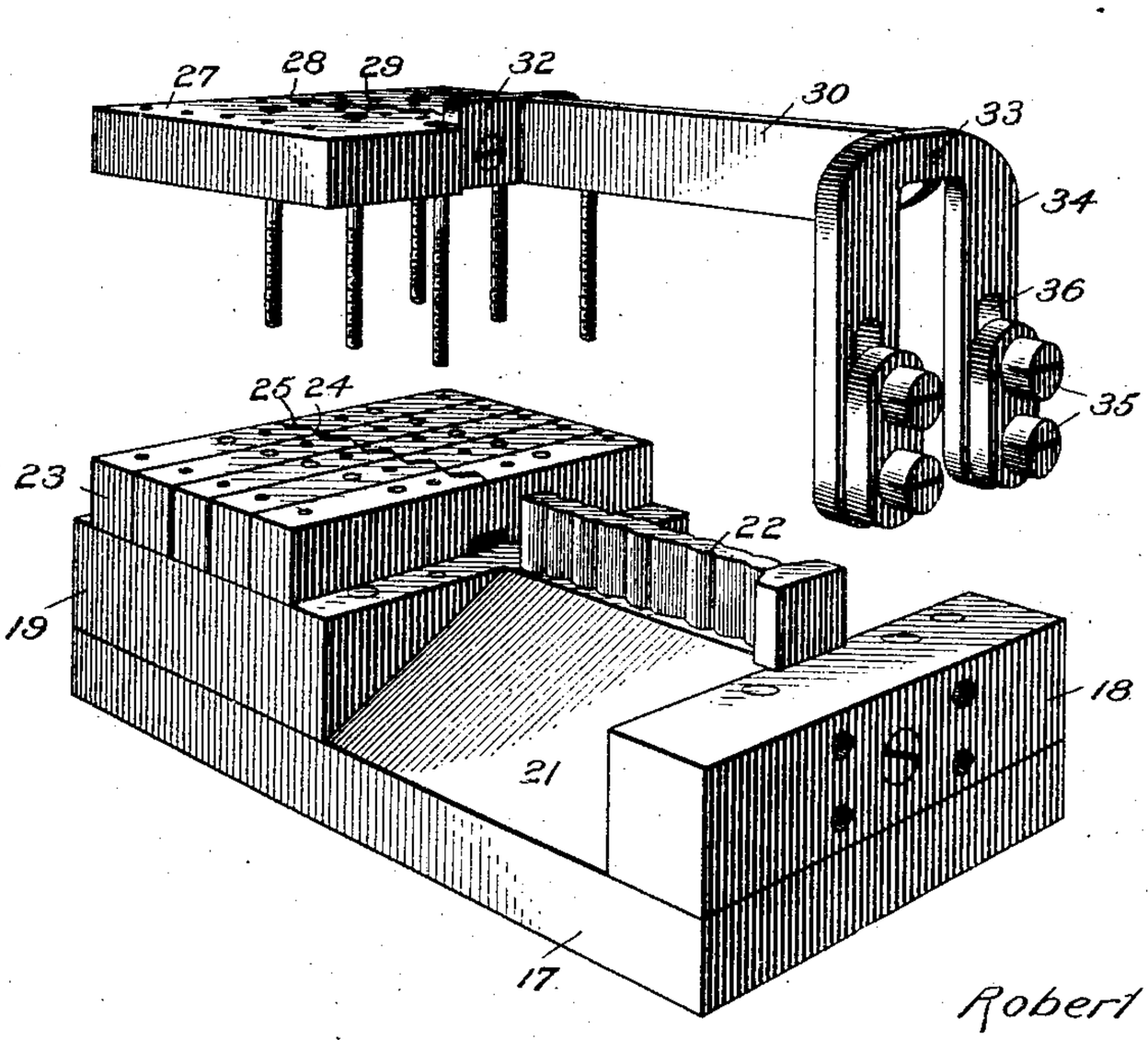
DIE MECHANISM FOR CUTTING CONTIGUOUS FASTENERS.

APPLICATION FILED SEPT. 5, 1903.

4 SHEETS—SHEET 1.

Fig. 1.





Witnesses
Edwin L Bradford
C B Mc Kinney

Inventor
Robert B Lewis
By J. Stanville Meyers
Attorney

No. 786,503. PATENTED APR. 4, 1905.

R. B. LEWIS.

DIE MECHANISM FOR CUTTING CONTIGUOUS FASTENERS.

APPLICATION FILED SEPT. 5, 1903.

4 SHEETS—SHEET 2.

Fig. 2.

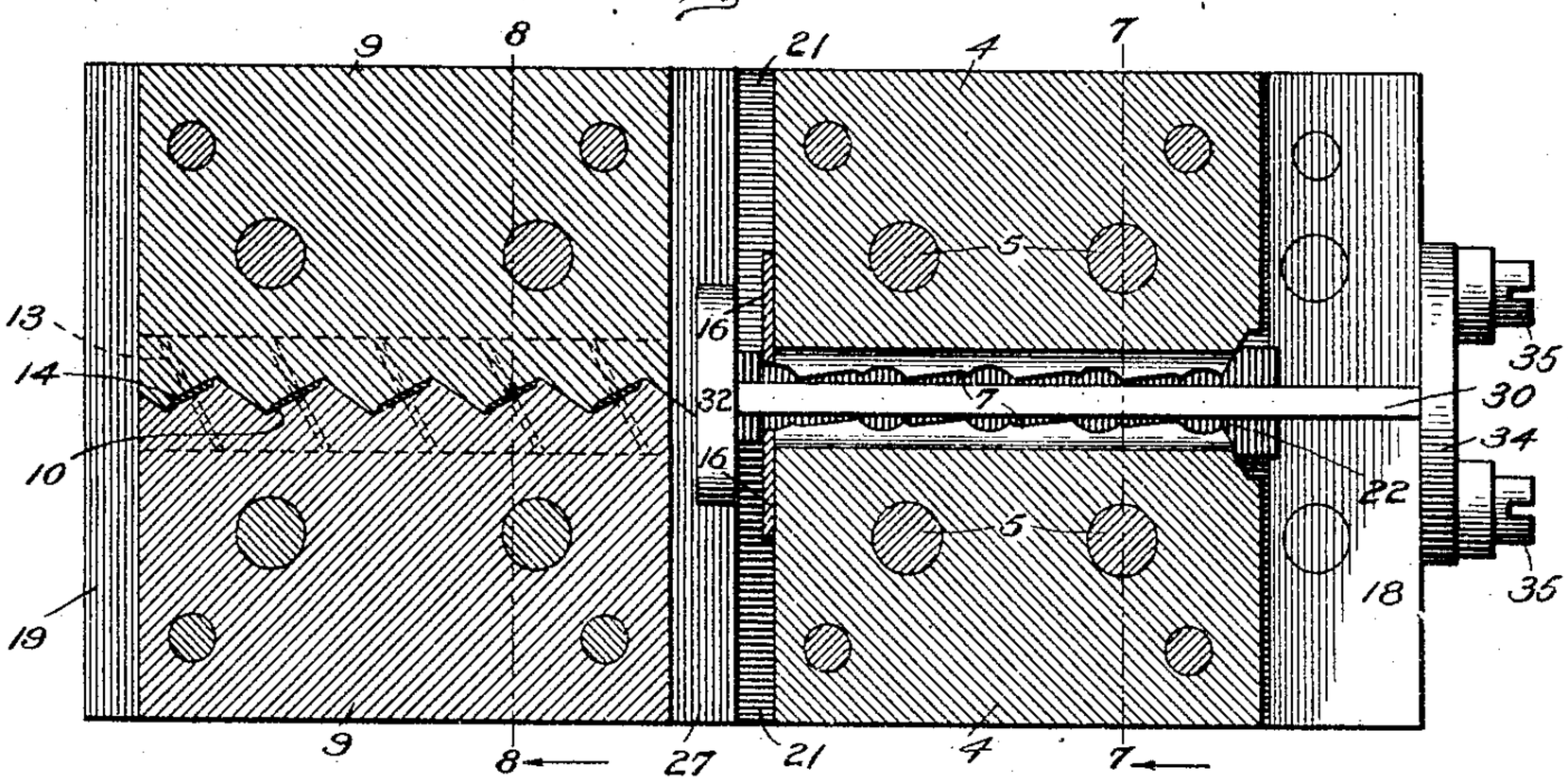


Fig. 3.

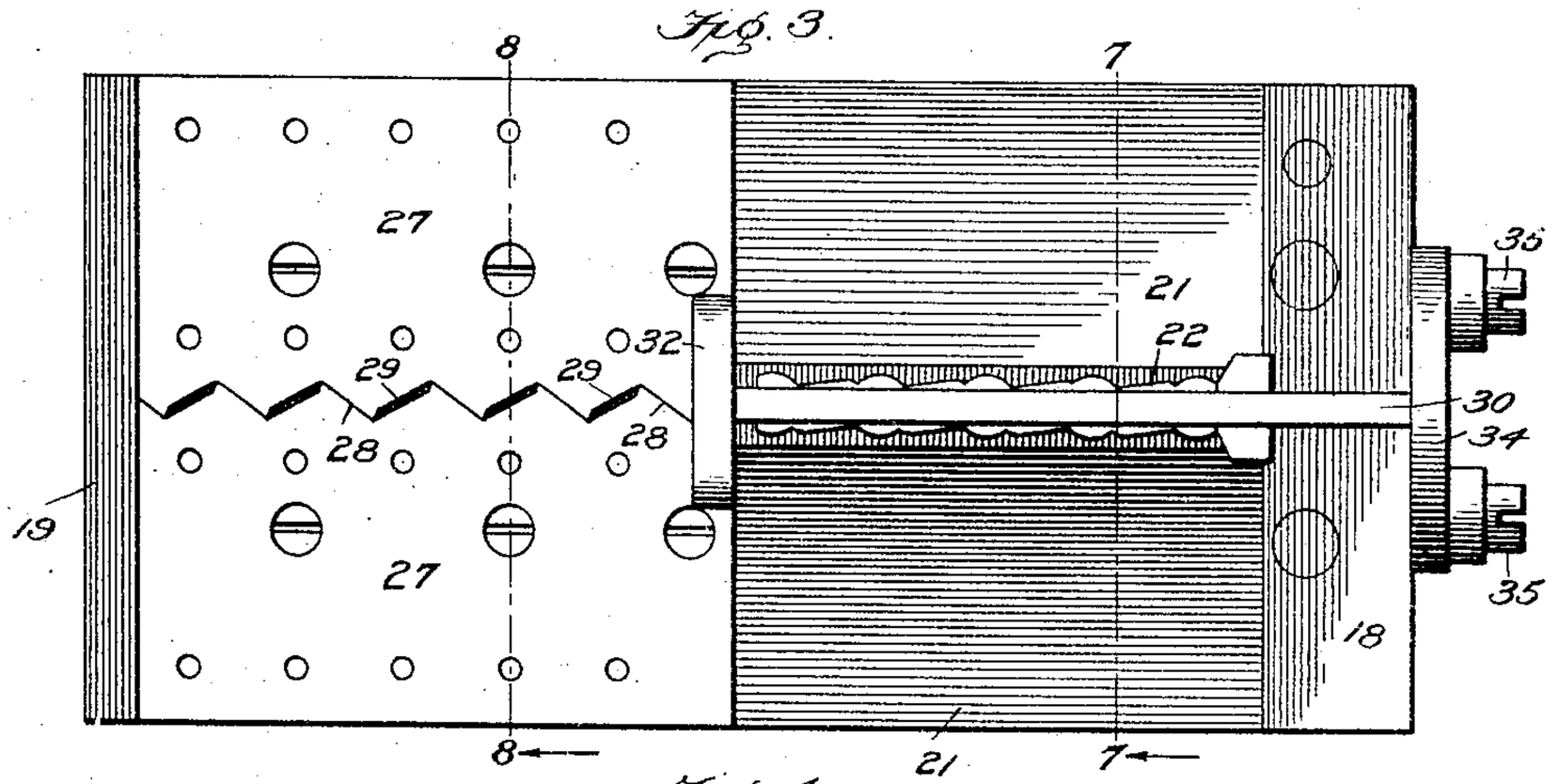
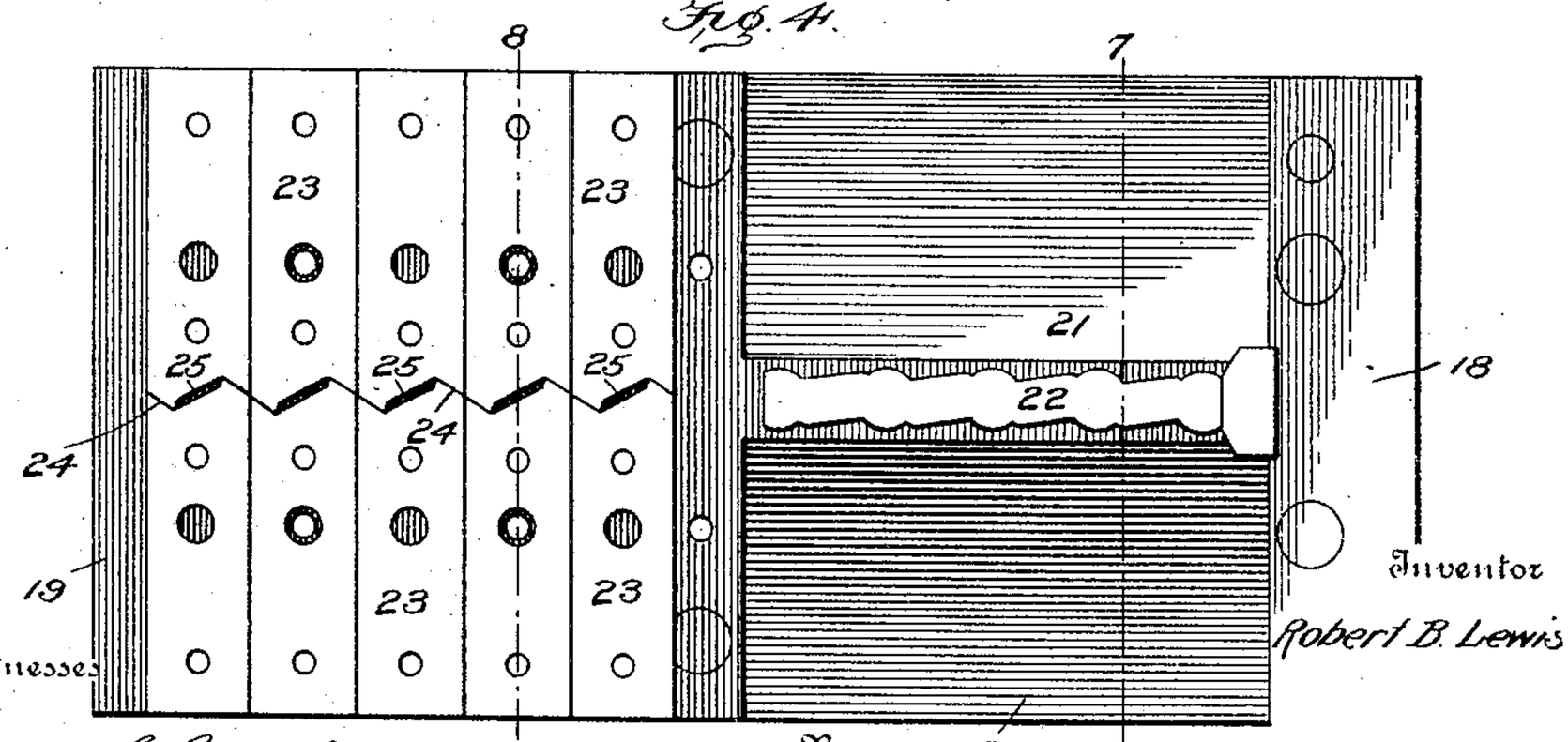


Fig. 4.



Witnesses

Edwin L. Bradford

C. F. McKenney

Inventor

Robert B. Lewis

By J. Granville Meyers

Attorney

No. 786,503. PATENTED APR. 4, 1905.

R. B. LEWIS.

DIE MECHANISM FOR CUTTING CONTIGUOUS FASTENERS.

APPLICATION FILED SEPT. 5, 1903.

4 SHEETS—SHEET 3.

Fig. 5

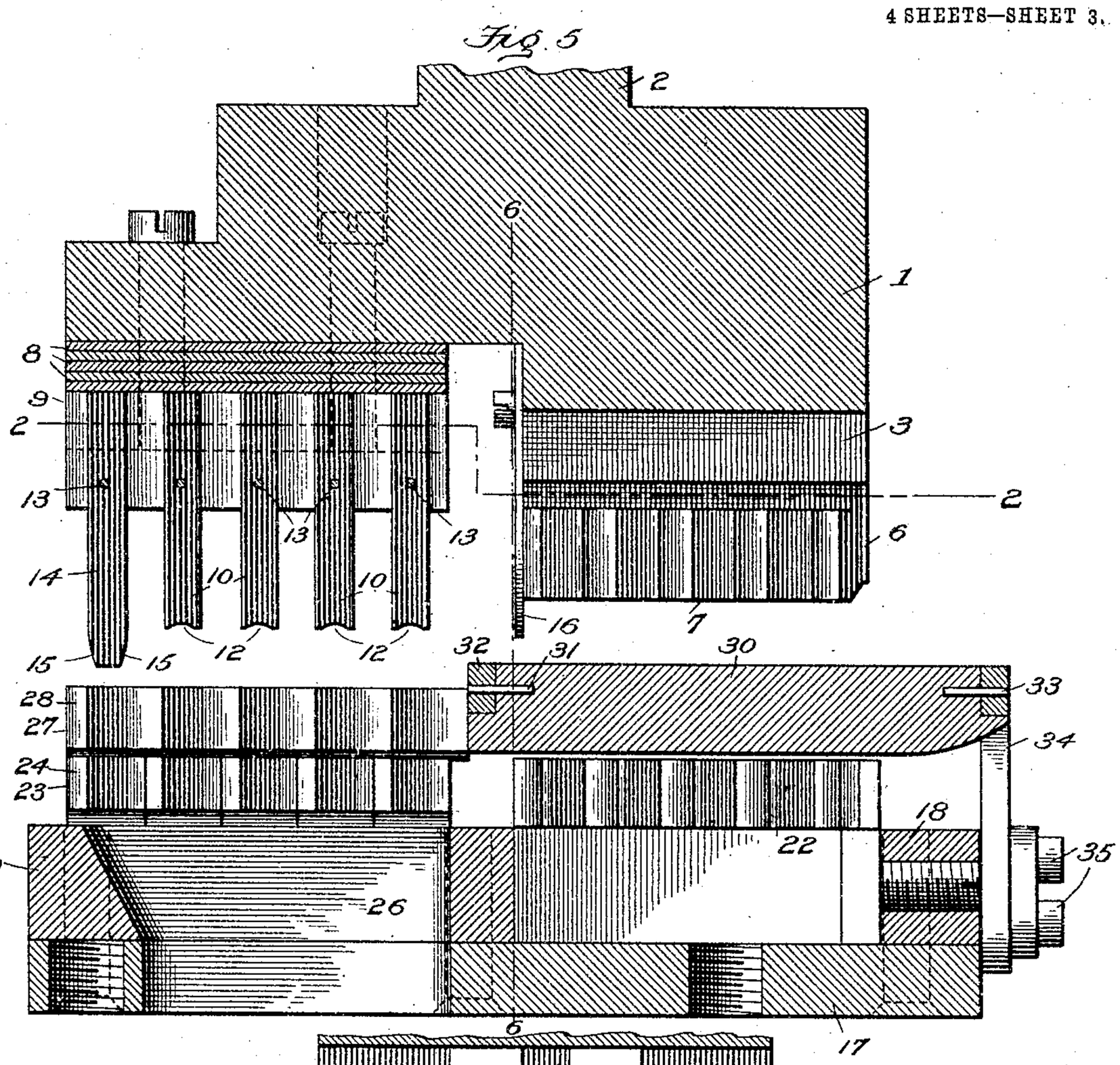
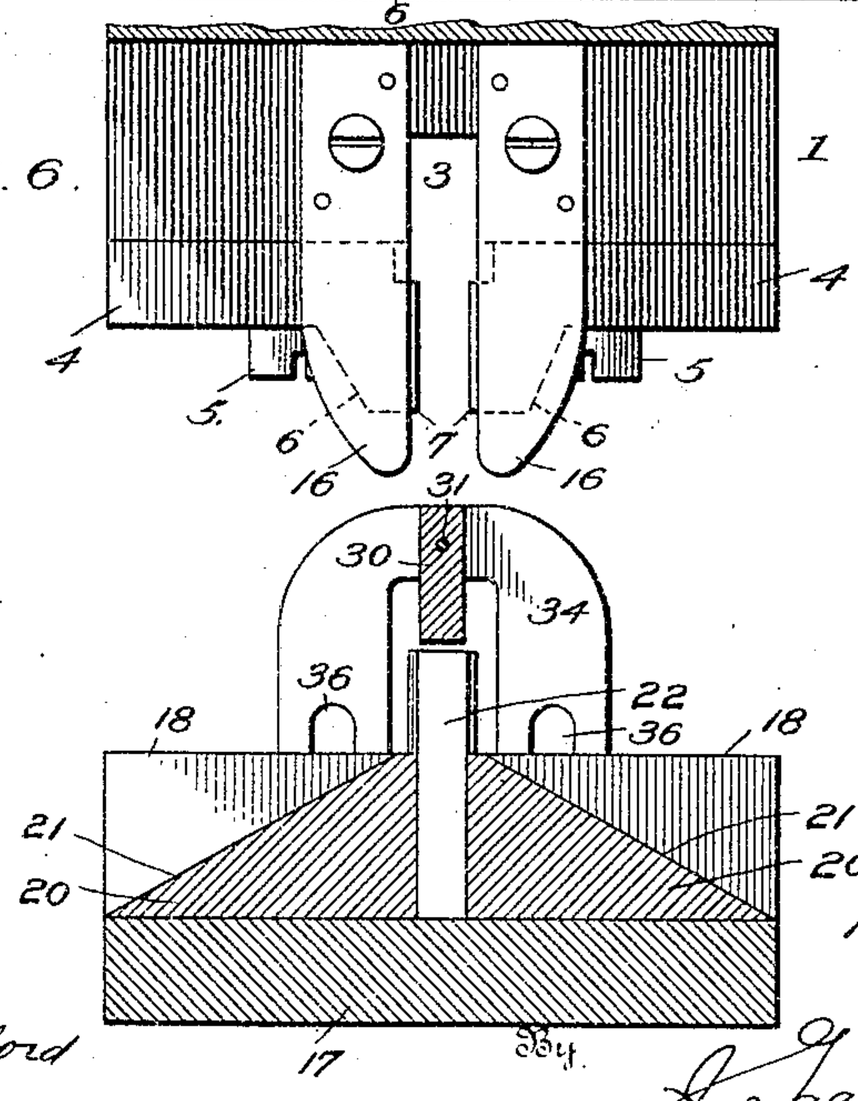


Fig. 6.



Witnesses

Edwin L. Bradford

C. F. McKinney

Inventor

Robert B. Lewis

By J. Daniels Meyers

Attorney

No. 786,503. PATENTED APR. 4, 1905.

R. B. LEWIS.

DIE MECHANISM FOR CUTTING CONTIGUOUS FASTENERS.

APPLICATION FILED SEPT. 5, 1903.

4 SHEETS—SHEET 4.

Fig. 7

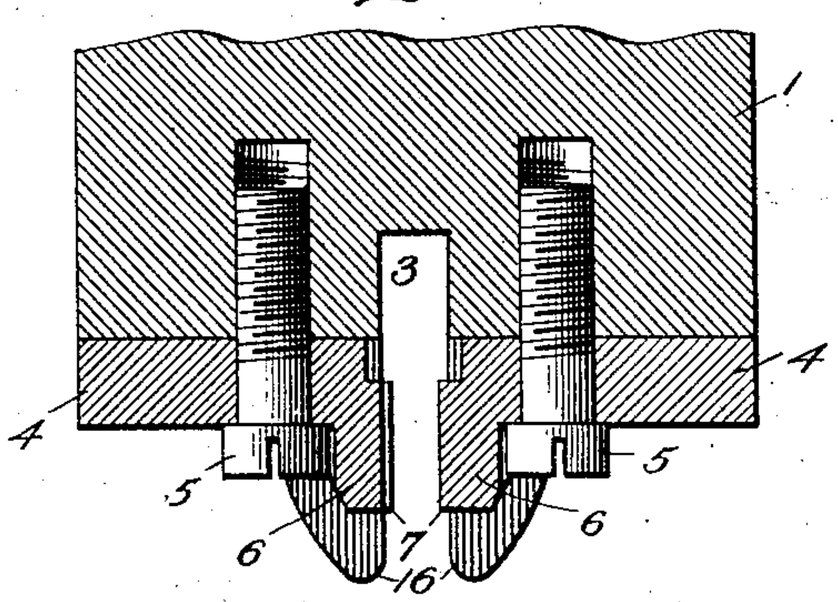
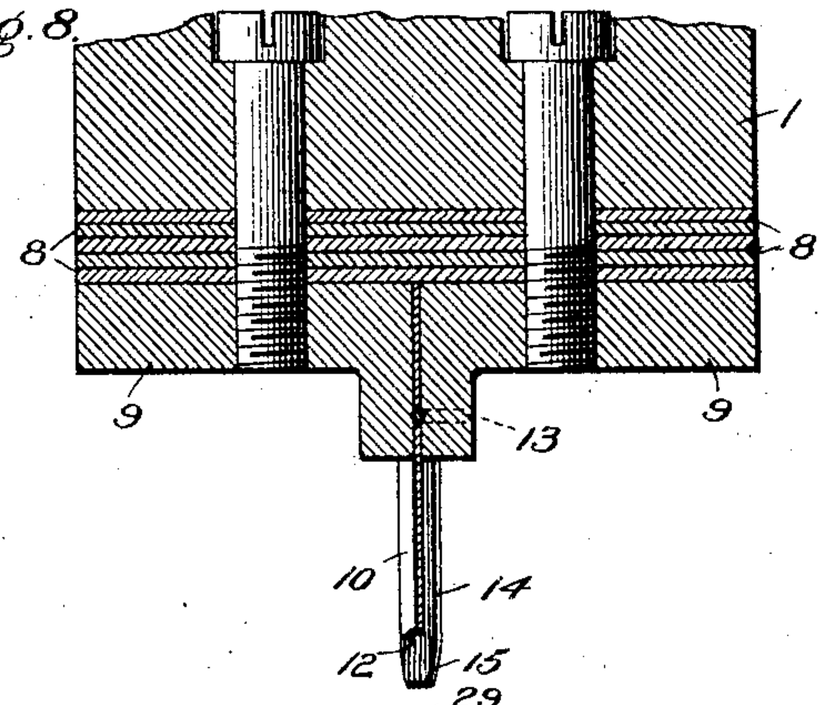


Fig. 8.



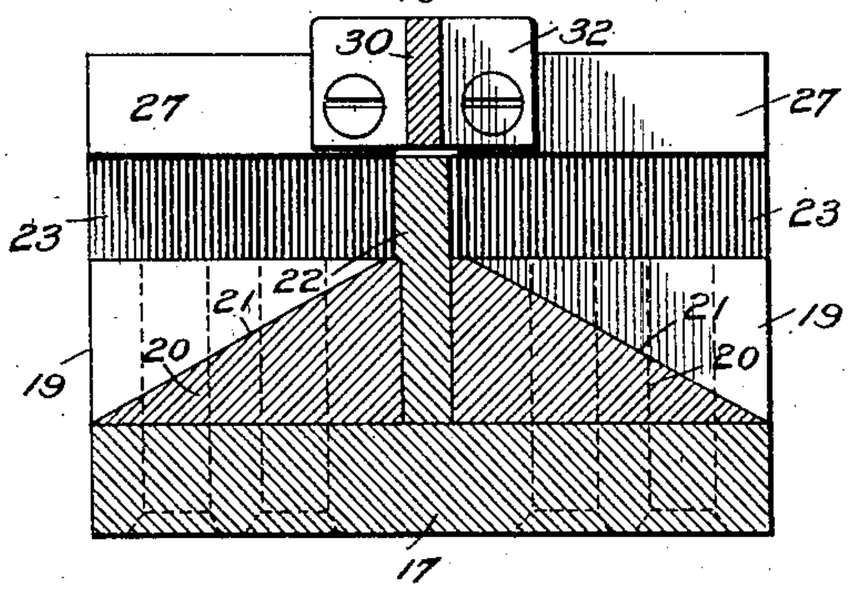


Fig. 9.

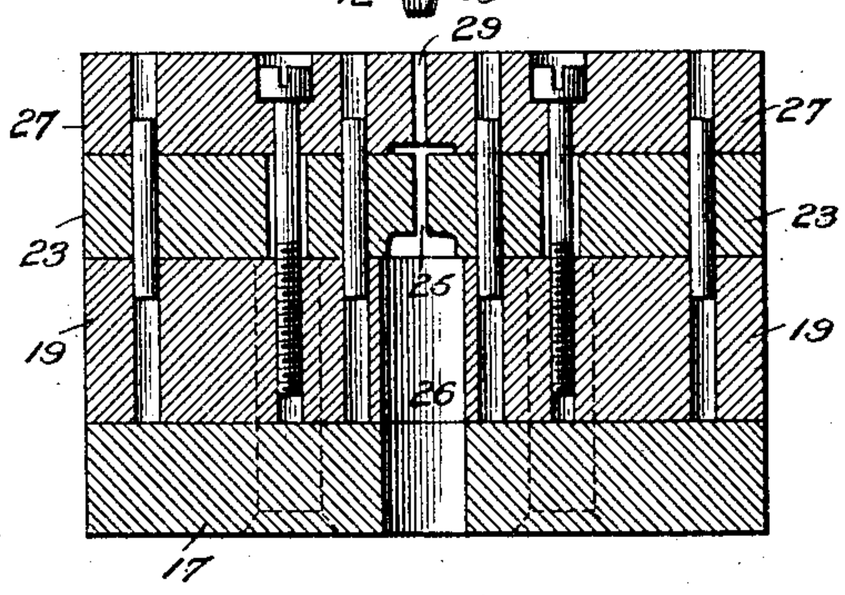
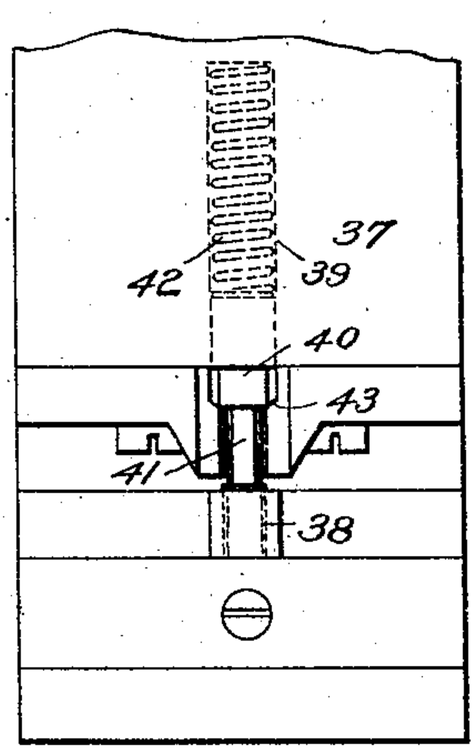


Fig. 10



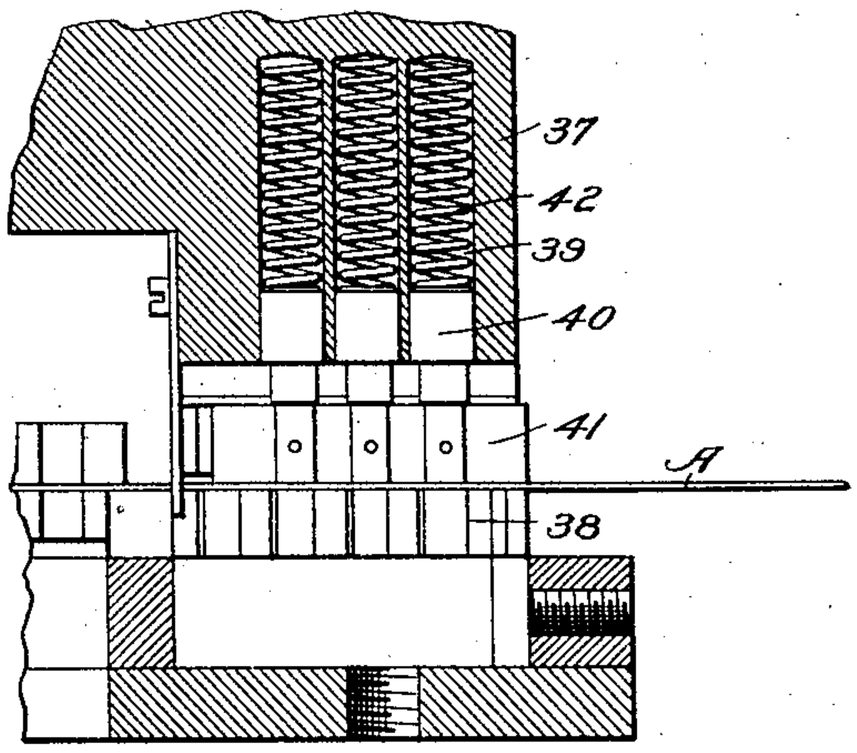
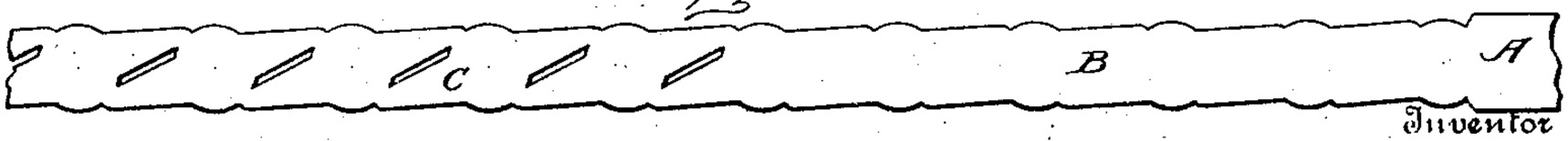


Fig. 11



Witnesses

Edwin L. Bradford

C. B. McKinney

Inventor

Robert B. Lewis

By J. Scawille Meyer

Attorney

No. 786,503. Patented April 4, 1905.

UNITED STATES PATENT OFFICE.

ROBERT B. LEWIS, OF PHILADELPHIA, PENNSYLVANIA, ASSIGNOR TO THE AMERICAN METAL EDGE BOX COMPANY, OF PHILADELPHIA, PENNSYLVANIA, A CORPORATION OF NEW JERSEY.

DIE MECHANISM FOR CUTTING CONTIGUOUS FASTENERS.

SPECIFICATION forming part of Letters Patent No. 786,503, dated April 4, 1905.

Application filed September 5, 1903. Serial No. 172,135.

To all whom it may concern:

Be it known that I, ROBERT B. LEWIS, a citizen of the United States, residing at Philadelphia, in the county of Philadelphia and State of Pennsylvania, have invented new and useful Improvements in Die Mechanism for Cutting Contiguous Fasteners, of which the following is a specification.

My present invention relates to certain new and useful improvements in die mechanism especially constructed for forming metallic fasteners or rivets of the type shown and described in the Letters Patent granted upon the 28th day of October, 1902, to John S. Stokes, No. 712,422, in which a series of rivets or fasteners are joined together in a continuous strip of indefinite length, each rivet or fastener comprising a head and two prongs extending outward from the head at opposite sides thereof, the points of the prongs of one rivet or fastener being connected to the heads of adjacent rivets or fasteners and the prongs of the fasteners being slightly separated one from the other by diagonally-arranged punch-openings and all the fasteners of the strip being disposed at an angle to a line taken longitudinally and centrally of the strip. Continuous fasteners or rivets of this type are formed from a thin metallic ribbon by cutting opposite edges of the strip to form portions of the heads and the prongs of the rivets or fasteners and then punching out equidistant diagonal slots or openings to form the opposite sides of the prongs and heads, the resultant article being a continuous strip of contiguous rivets or fasteners. This strip is fed into a forming and setting-up machine, where the fasteners are severed and applied one at a time.

Considerable difficulty has been experienced in providing suitable means for cutting a rivet or fastener strip of the type described, owing to the fact that the fasteners are comparatively small—thus requiring the edge-trimming cutters to be placed close together, and an attempt to provide means for cutting the opposite edges of the strip and simultaneously punching out the diagonal slots between the said edges as they are being trimmed or cut proved to be a failure from a practical manufacturing standpoint of view, chiefly because of the fact that the die mechanism thus constructed to simultaneously cut and punch the strip could not be made strong and durable enough to withstand the strains and wear to which it was subjected during operation.

My present invention is designed to overcome the objections set forth above, and the means I employ comprises die members constructed to trim the opposite edges of a metallic ribbon to form portions of the heads and prongs of the fasteners and a suitable punch or punches for punching out the equidistant diagonal openings to form the opposite sides of the prongs and heads, these two operations being carried on simultaneously, but at different portions of the strip, means being also provided to properly guide and center the strip relatively to the cutters and punches, so as to insure a true register and alinement of the parts.

In the accompanying specification and drawings I have shown and described one embodiment of the invention wherein the metallic ribbon is first cut or trimmed on opposite sides for the purpose heretofore set forth and the diagonal slots then cut therein; but I wish it understood that I may carry on these operations in a reverse order—namely, first cut out the diagonal slots and then trim the opposite edges of the strip. From this statement it will be understood that the salient feature of the invention is the employment of means for forming continuous strips of completely-formed fasteners of the type described by separately performing the trimming and punching operations.

In order to enable others to clearly understand, make, and operate my said invention, I will now proceed to describe the same in detail, reference being had for this purpose to the accompanying drawings, in which—

Figure 1 is a perspective view of the die mechanism complete for forming contiguous fasteners of the character described, the parts of the mechanism being separated for the sake of clearness. Fig. 2 is a horizontal sec-

tional view taken on the line 2 2 of Fig. 5. Fig. 3 is a plan view of the lower member of the die mechanism, the punch-guide and stripper being shown in place upon the lower member of the die mechanism. Fig. 4 is a plan view of the lower member of the die mechanism, the punch-guide and the stripper being removed. Fig. 5 is a vertical sectional view of the die mechanism complete. Fig. 6 is a transverse sectional view taken on the line 6 6, Fig. 5. Fig. 7 is a vertical sectional view taken on the line 7 7 of Figs. 2, 3, and 4. Fig. 8 is a vertical sectional view taken on the line 8 8 of Figs. 2, 3, and 4. Figs. 9 and 10 show, respectively, an end elevation and a vertical sectional view of a slightly-modified form of stripper; and Fig. 11 is a plan view of the fastener-strip, illustrating the several stages of the trimming and punching operations.

Like numerals of reference indicate corresponding parts throughout the several figures.

The numeral 1 designates the upper reciprocatory member of the die mechanism, which comprises a metallic head having two lower faces arranged on different planes, said head being provided with an integral shank 2, by which it may be secured to a suitable reciprocatory press. (Not shown.) The said head is further provided in its lowermost face with a centrally-arranged longitudinal groove 3 to receive a stripper-bar, which will presently be described.

The means employed for trimming the opposite edges of the metallic ribbon from which the fastener-strip is formed comprises two similarly-constructed plates 4, which are firmly but removably secured to the under side of the lowermost face of the head 1 by means of screws 5. Each plate is provided along its inner longitudinal edge with a downwardly-extending flanged portion 6, and each flange is provided with a cutting edge 7, shaped to cut opposite edges of the metallic ribbon to form portions of the heads and prongs of the fasteners, as more clearly shown in Figs. 2 and 11 of the drawings. In the present instance I have shown the cutters as constructed to form a gang of four rivets or fasteners; but it will be understood that these cutters may be constructed to form a greater or a less number of such fasteners.

To the under face of the uppermost plane of the head 1 is removably secured, by means of screws, a plurality of superposed thin metallic spacing-plates 8, and upon the lowermost plate are removably secured by screws a pair of retainer-plates 9, the adjacent edges of which are cut on a zigzag line, and between the adjacent walls of some of said zigzag lines are fitted the ends of the punches 10 for forming the diagonal slots between the adjacent prongs of the fasteners. As more clearly shown in Figs. 2 and 5 of the drawings, each punch 10 consists of a substantially flat bar of tempered steel, the lower end of which is slightly concaved, as at 12, to provide separate cutting edges to facilitate the initial entry of the punch into the stock without buckling the same. The punches are securely held between the retainer-plates 9 by means of pins 13. By mounting the punches in the manner described it will be seen that in case of rupture or breakage of any of the punches of the gang the ruptured or injured punch can be readily removed and a new punch substituted therefor. The object of employing the plurality of spacer-plates 8 is to enable the punches to be readily adjusted to compensate for wear during operation, it being understood that the cutting ends of the punches require sharpening from time to time, which sharpening operation necessarily shortens the punches, and this shortening can be readily compensated for by simply inserting additional spacer-plates as required.

The number 14 designates an alining or centering pin or blade, which is arranged in front of the outermost punch of the gang, said pin or blade being located between and fastened to the plates 9 similar to the manner of mounting the punches 10, as before described. The object of this alining or centering pin or blade is to enter one of the diagonal openings formed in the strip during the punching and cutting operation to accurately center and aline the strip in such position as to insure a proper engagement of the cutters and punches with the strip relatively to the previously-formed punchings and cuttings. By referring to Fig. 5 of the drawings it will be seen that the lower end of the alining or centering pin or blade projects below the lower end of the punches in such a manner that during the operation of the head the said pin or blade will enter the diagonal slots slightly in advance of the engagement of the punches with the strip, and to facilitate the entry of the said centering pin or blade its lower end is slightly beveled on opposite sides, as at 15.

It will be seen that the centering pin or blade serves to hold and aline the strip near the outer end of the die mechanism only adjacent to the punches, and I have found that it is desirable to provide additional means for guiding and centering the strip at a point adjacent to the edge-trimmers also. To accomplish this end, I have provided what I term a "pilot," which consists of two separate plates 16, secured to the head 1 centrally between the innermost punch of the gang and the inner end of the edge-trimming cutters, as more clearly shown in Figs. 5 and 6. The lower ends of these pilot-plates are slightly rounded and extend down below the edge-cutters and are so arranged that as the head 1 descends to bring the cutters and punches toward the metallic ribbon they will straddle and engage opposite sides of the previously-formed head of a fastener to hold and aline the strip or

ribbon in advance of the action of the edge-cutters, thus insuring an absolutely true register of the punches and cutters with the fastener-strip relatively to the previously-formed fasteners.

The lower member of the die mechanism comprises a base-block 17, having removably attached thereto by screws an end piece 18 and a bed-block 19, which are located at opposite ends thereof, and between the said end piece and bed-block are located two blocks 20, the upper face of each of which is beveled or inclined in opposite directions, as at 21. (See Figs. 1 and 6.) These blocks 20 are slightly separated from each other, and between the two is located the male member 22 of the trimming-cutters, which coöperates with the trimming edges 7 of the cutters heretofore described. The opposite edges of the said male member 22 are shaped to conform to the cutting edges of the edge-trimmers and are so positioned relatively thereto that the said edge-trimmers will straddle the same during its descent or during the cutting or trimming operation. Secured to the upper face of the bed-block 19 are a series of similarly-constructed and oppositely-arranged blocks 23, the adjacent ends of which are cut away on zigzag lines, as at 24, as more clearly shown in Fig. 4, the said adjacent ends of the plates being recessed, as at 25, to provide an opening between each pair of opposite blocks corresponding in outline to the shape of the punches 10, these openings thus forming the female member of the punching mechanism. The base-block 17 and the bed-block 19 are both hollowed out or recessed centrally, as shown at 26, Fig. 5, to permit the escape of the scrap-punchings from the fastener-strip made by the punches.

Secured to and mounted slightly above the bed-block 19 is a pair of similarly-constructed guide-blocks 27, having their adjacent edges cut on zigzag lines, as at 28, and provided with openings 29, (see Fig. 3,) through which openings the punches pass during operation and by which they are accurately guided and directed. Arranged directly above but slightly removed from the male member 22 of the edge-trimming die is a stripper-bar 30, said bar being secured at its inner end by a pin 31 to a plate 32, which latter is attached to the guide-blocks 27 and which is secured at its front end by means of a pin 33 to a U-shaped yoke 34, said yoke being adjustably attached to the end block 18 by means of screws 35 passing through elongated slots 36 in the ends of the yoke.

Die mechanism of the type herein described must necessarily be made of highly-tempered steel in order that the parts thereof may withstand the wear and tear to which they are subjected during operation, and it has been found that tempering the various parts of the die after their formation ofttimes tends to so shrink or contract them that they will not properly and accurately fit and assemble one within the other after the tempering operation, and it is to overcome this objection that I have constructed my die mechanism from a number of separable interlocking and interchangeable parts or elements, thus enabling me to readily and quickly substitute new parts for those which fit improperly. This manner of constructing the die mechanism also enables a ready and quick substitution of a fresh part for a broken one in case of rupture or injury to any of the elements, thus avoiding the necessity and saving the expense of making an entirely new die.

In Figs. 9 and 10 I have illustrated a slightly-modified form of stripper which differs from the stripper-bar heretofore described in that it is yieldingly mounted instead of being fixed. In the said figures the numeral 37 designates the head corresponding to the head 1 of the other views, and 38 designates the male member of the edge trimmer or cutters. The head 37 has formed therein a plurality of recesses or sockets 39, in each of which is mounted a plunger 40, and to the lower end of these plungers is attached the stripper-bar 41. Coil-springs 42 are located in the recesses 39 in the head and exert a yielding pressure upon the plungers in such manner as to force the stripper-bar 41 downward upon the metallic ribbon with a yielding pressure. Undue downward movement of the plungers and stripper-bar is prevented by the heads of the plungers coming in contact with inwardly-projecting portions 43 of the edge-trimmers, as more clearly shown in Fig. 9.

The operation of the die mechanism may be briefly stated as follows, it being assumed that the parts thereof are mounted in a suitable stamping-press having a reciprocating part and a bed: A thin metallic ribbon, such as shown at A to the right of Fig. 11, is fed in a step-by-step manner between the male member 22 and the stripper-bar 30 of the die mechanism, it being understood that the feeding of the strip is effected during the downward movement of the head 1. On the descent of the head the edge-trimming cutters are brought into engagement with the metallic ribbon and the opposite edges thereof are trimmed so as to form portions of the heads and prongs of a gang of rivets or fasteners, as shown at B to the right of Fig. 11. On the ascent of the head upward movement of the strip therewith, which is likely to occur owing to the fact that the edges thereof have a tendency to cling to the cutters, is prevented by the stripper-bar 30, which serves to force the strip from between the cutters. When the edge-trimmers have moved sufficiently up to clear the strip, the latter is fed forward a sufficient distance to bring the first partially-formed fastener of the series under the first punch of the gang, and on the next descent of the head the punches will enter the

strip at equidistant points properly arranged relatively to the previously-formed heads to punch diagonally-arranged slots therein, and thus form the remaining sides or portions of the prongs and heads of the previously partially formed fasteners, as shown at C in the left of Fig. 11, which punching operation completes the fastener-strip, the said strip in its completed form comprising a plurality of completely-formed connected fasteners, the points of the prongs of one fastener being joined to the heads of the adjacent fasteners. After the first gang of fasteners has been formed as just described and on the continued operation of the die mechanism it will be seen that the alining or centering pin or blade will upon each descent of the head enter one of the previously-formed diagonal slots and accurately center and aline the strip relatively to the punches and trimming mechanism, so that these elements will act upon the strip at the proper point to accurately and truly perform their operations. In like manner the pilot before described will engage opposite edges of the strip to aid in more accurately alining the same. The foregoing operations are carried on continuously, the strip being fed intermittently as the die mechanism is performing the punching operations.

While I have herein shown and described my improved die mechanism as constructed to make a strip of continuous fasteners of a particular form, I do not wish to be understood as limiting myself to mechanism for making only strips of this configuration, for it will be obvious that other forms of strip may be made by changing the configuration of the edge-trimmers and the position or configuration of the punches. The broad invention here sought to be protected is die mechanism for forming a continuous strip of connected rivets having openings therein, said mechanism comprising edge-trimmers and punches, the said two elements being arranged to act separately upon the stock at different points along its length to simultaneously trim opposite edges of the stock at one place and form openings therein at another place, with means for accurately alining and centering the strip relatively to the punches and cutters.

I believe that I have invented a novel method of forming a strip of the character herein shown and described; but I do not claim the same herein, as the method will form the subject-matter of a separate application for patent.

What I claim, and desire to secure by Letters Patent, is—

1. Die mechanism of the character described, comprising means for trimming opposite edges of a strip to form portions of the heads and prongs of contiguous fasteners, and means for punching properly-spaced openings in said strip to complete the formation thereof, said trimming and punching means operating simultaneously along different portions of the strip.

2. Die mechanism of the character described, comprising cutters for trimming opposite edges of a strip to form portions of the heads and prongs of a gang of contiguous fasteners, and punches for forming equidistant openings in the strip between the previously-formed heads to complete the formation of the strip, said cutters and punches operating along different portions of the strip.

3. Die mechanism of the character described, comprising means for trimming opposite edges of a strip to form portions of the heads and prongs of contiguous fasteners, means for punching properly-spaced openings in the strip between the partially-formed heads to complete the formation of the strip, and means for centering and alining the strip during the operation of said mechanism.

4. Die mechanism of the character described, comprising cutters for trimming opposite edges of a strip to form portions of the heads and prongs of a gang of contiguous fasteners, punches for forming equidistant openings in the strip between the previously-formed heads to complete the formation of the strip, said cutters and punches operating along different portions of the strip, and means for centering and alining the strip.

5. Die mechanism of the character described, comprising a pair of cutters for trimming opposite edges of a strip to form portions of the heads and prongs of a gang of contiguous fasteners, punches for forming equidistant openings in the strip between the previously-formed heads to complete the formation of the strip, said cutters and punches operating along different portions of the strip, and an alining pin or blade operating to enter one of the previously-formed openings in advance of the punches to properly aline the strip.

6. Die mechanism of the character described, comprising a pair of cutters for trimming opposite edges of a strip to form portions of the heads and prongs of a gang of contiguous fasteners, punches for forming equidistant openings in the strip between the previously-formed heads to complete the formation of the strip, said cutters and punches operating along different portions of the strip, an alining pin or blade operating to enter one of the previously-formed openings in advance of the punches to properly aline the strip and means operating upon another part of the strip adjacent to the edge-trimmers to center and support the strip.

7. Die mechanism of the character described, comprising a pair of cutters for trimming opposite edges of a strip to form portions of the heads and prongs of a gang of contiguous fasteners, punches for forming equidistant openings in the strip between the previously-formed heads to complete the for-

mation of the strip, said cutters and punches operating along different portions of the strip, an alining pin or blade operating to enter one of the previously-formed openings in advance of the punches to properly aline the strip and a pilot arranged to engage opposite edges of the strip in advance of the edge-trimmers to center and support the strip.

8. Die mechanism of the character described, comprising a head, a pair of edge-trimming blades and a gang of punches carried by the head, said punches located in line with the blades, and a base-block carrying a male member which coöperates with said edge-trimmers and female members which coöperate with said punches.

9. Die mechanism of the character described, comprising a head, a pair of edge-trimming cutters and a gang of punches carried by the head, said punches located in line with the cutters, a base-block carrying a male member which coöperates with said edge-cutters and female members which coöperate with said punches, and a stripper-bar coöperating with the said edge-cutters and their coöperating male member.

10. Die mechanism of the character described, comprising a head, a pair of edge-trimming cutters and a gang of punches carried by the head, said punches located in line with the cutters, a base-block carrying male and female members which coöperate respectively with said cutters and punches, a stripper-bar interposed between the said cutters, and a guide-block having openings therethrough for the punches.

11. Die mechanism of the character described, comprising a head, a pair of edge-trimming cutters removably connected to said head, a pair of plates also connected to said head and having their adjacent edges cut away on zigzag lines, punches having their upper ends located between the adjacent edges of said plates and secured thereto, and a base-block carrying male and female members which coöperate with said cutters and punches.

12. In die mechanism of the character described, a head having its under face formed on two planes, a pair of edge-trimming cutters connected to the lowermost plane, a pair of abutting plates removably secured to the upper plane, the adjacent edges of said plates being cut away on zigzag lines, and punches having their upper ends located between the adjacent edges of the plates and secured thereto.

13. Die mechanism of the character described, comprising a head, edge-trimming cutters and punches carried by said head, a base-block, male and female die members carried by said base-block and coöperating with the said cutters and punches, said female die member comprising a plurality of abutting blocks the adjacent ends of which are cut away on zigzag lines and recessed.

14. In die mechanism of the character described, the combination with a gang of diagonally-arranged punches, of a coöperating female die member comprising a plurality of abutting blocks the adjacent ends of which are cut away on zigzag lines and recessed to provide a series of punch-openings to receive the punches.

15. Die mechanism for forming contiguous metallic fasteners of the character described, comprising a head carrying a pair of edge-trimming cutters shaped to trim opposite edges of the metallic ribbon to form portions of the heads and prongs of a gang of fasteners, a series of punches also carried by the head and arranged in line with the cutters, each punch comprising a flat diagonally-arranged blade, and male and female die members cooperating with said cutters and punches respectively.

In testimony whereof I have hereunto set my hand in presence of two subscribing witnesses.

ROBERT B. LEWIS.

Witnesses:
CHAS. H. BURR,
FREDERICK G. FARQUHAR.